Waves	The Young double-slit experiment	
Learning objectives	**MUST (6)**	Explain the set-up of the Young double-slit experiment
	SHOULD (7)	Apply the equation to problems to find slit separation, distance and wavelength
	COULD (8/9)	Describe why this experiment cannot be explained using classical physics

STARTER:

What can you tell me about the nature of light? How do we know this?

EXTENSION: Richard Feynman described a particular phenomenon as being...
' impossible, absolutely impossible, to explain in any classical way, and which has
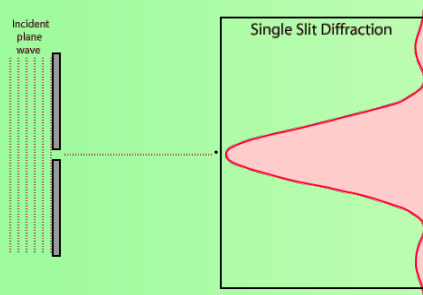in it the heart of quantum mechanics.'.
  What was he talking about?

▶ 0:04:00 ⚙

Oct 16-21:59

Waves	The Young double-slit experiment

MUST (6)	Explain the set-up of the Young double-slit experiment

If you shone a laser through a small slit at a screen, what would you expect to see?
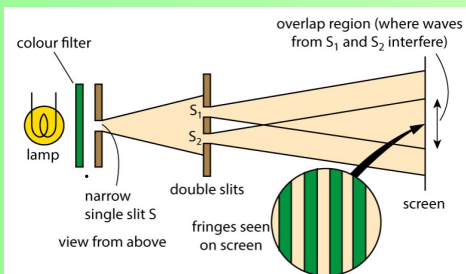
What would we call this effect, and when is it most likely to happen?

Single slit **diffraction** (spreading out).

So∴..what would we expect to see if we had two slits next to each other?

If we consider light as a **wave,** what should happen?

Paste in the diagram.

a) What does each slit act as?

b) What do the green and pink areas represent, in terms of interference?

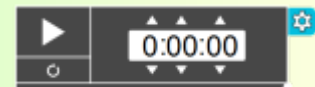c) Why does there have to be a colour filter?

Waves	The Young double-slit experiment

SHOULD (7)	Apply the equation to problems to find slit separation, distance and wavelength

Stick the diagram and mathematical explanation into your book. Note that it **only** works if D >> a (where D = distance, a = slit separation, and >> means 'much greater than'.

For a wave of wavelength λ,　　　$$\lambda = \frac{ax}{D}$$

x is separation of fringes, D is distance from slits to screen, a is slit separation

Now apply this to:

Task One: the questions in the green box on page 226

Task Two: summary questions 2-5

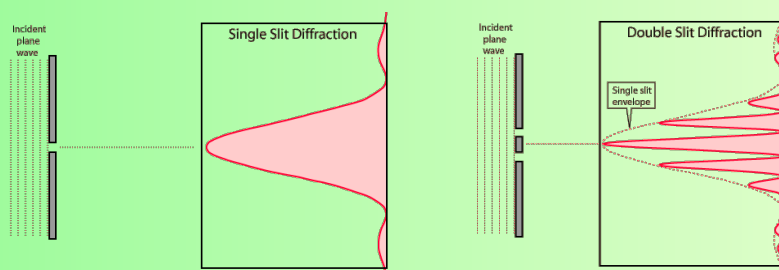Oct 16-21:59

Waves	**The Young double-slit experiment**

COULD (8/9)	Describe why this experiment cannot be explained using classical physics

https://phet.colorado.edu/en/simulation/legacy/quantum-wave-interference

The quantum experiment that broke reality - 1.40ish on
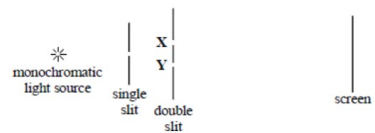
Are photons particles or waves? Do they have consciousness, or awareness?

Oct 16-21:59

Waves	The Young double-slit experiment

Learning objectives	MUST (6)	Explain the set-up of the Young double-slit experiment
	SHOULD (7)	Apply the equation to problems to find slit separation, distance and wavelength
	COULD (8/9)	Describe why this experiment cannot be explained using classical physics

PLENARY: (Extension: explain why all of the others are not true)

The diagram represents the experimental arrangement used to produce interference fringes in Young's double slit experiment.

X
Y

monochromatic light source   single slit   double slit   screen

The spacing of the fringes on the screen will increase if

A   the width of the single slit is increased

B   the distance **XY** between the two slits is increased

C   a light source of lower frequency is used

D   the distance between the single and double slits is decreased

(Total 1 mark)

C

0:04:00

Mar 12-14:35